

MEASUREMENT OF TERRESTRIAL NEUTRONS UP TO 10.0 MEV IN SÃO JOSÉ DOS CAMPOS, SP, BRAZIL DURING THE PERIOD OF JANUARY 2015 TO MARCH OF 2015

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ABSTRACT

A portable and compact system based on a He-3 gas tube (LND, USA; model 25311) with a sensitive area of approximately 250 cm² and covered with paraffin (9 cm) was used to detect and monitor neutrons at ground level in the energy range up to 10.0 MeV, during January 2015 to March 2015 in São José dos Campos, SP, Brazil (23° 12' S, 45° 52' W). The detector and other hardware instruments are housed in an air-conditioned room placed near ground level. Neutron counts were accumulated at 1-minute intervals continuously. The months of January/March 2015 were normal with respect to rainfall, being with drier and wet altering days in the region. Rainfall and cloud coverage were also normal and temperature reached record levels (30° C). Coincidentally, the average neutron counts for drier days (0.2 neutrons/minute) were also low compared with other rainy days showing the presence of induced cosmic ray neutrons up to 10.0 MeV energy. The measurements and FFT analysis of the data in these three months also show that neutron counts present a daily periodicity and that the peak occurs approximately when the sun is at its highest elevation (zenith) in the sky. This indicates that the neutrons are produced by cosmic rays and that they are not related to the presence of clouds or lightning discharges. Previous studies carried out by our research group in 2010-2014, in the same months, have observed that cloud coverage modulates neutron counts at this location in the tropics.

KEYWORDS: Neutrons, Cosmic Radiation, Monitoring